Ministry of Communications and Information
An Engaged and Connected Singapore

Speech by Senior Minister of State Dr Janil Puthucheary at the Opening of the Quantum Technology Summit, TechXLR8 Asia (part of Asia Tech x Singapore 2022), on 1 June 2022

Introduction

1.   Thank you for inviting me to join you here today. It is especially nice to be here in person to open the Quantum Technology Summit. For those who travelled into Singapore for the conference – a very warm welcome. We really appreciate that sense of confidence coming here. I think it is important to signal our confidence to get together in person as international travel starts again.

2.   IMDA, InformaTech and Quantum Engineering Programme (QEP) have put together the Quantum Technology Summit Programme this year, with three days of exciting talks. Joining our local experts, we welcome speakers from all over the world including the US, Europe and Japan. It is important that we continue to learn about the leading edge of technology. We have to be open to ideas, open to people coming here engaging with the world to make sure that we know what's happening and we can contribute to that leading edge of technology. We have to do so not just to bring benefits today to our people and our system here, so that we can prepare for changes for the future, and for the uncertainty. An operational quantum computer is not expected until 2030, but there is already an accelerated pace of research breakthroughs and innovations around the world in this area. Potentially, quantum technology could fundamentally change the way we compute, communicate, and protect information.

3.   I look forward to hearing not only how quantum technology has progressed within laboratories, but also the real-world benefits and risks that such a leap in technology could bring. A recent McKinsey study estimated that the value-add of quantum technology in early adopter sectors such as pharmaceuticals, chemicals, automotive and finance, is between US$300 and US$700 billion by 2035[1].

4.   But this accelerated pace has its flip side. Security experts have warned that quantum computing could pose significant risks to the existing digital infrastructure that we have worked hard to protect and secure under the existing security paradigm. For example, the security encryption that supports over 90% of our Internet traffic today is computationally-intensive to break with using classical computers, conventional supercomputers. But quantum-enabled algorithms can break such encryption potentially in hours. So it means that there is an opportunity for threat actors today to collect sensitive data, save them for potential decryption later, when opportunities provided by quantum computing mature. This is not a problem we can put off addressing to tomorrow but one that we need to address urgently today through the development of quantum-safe standards and networks.

---

[1] McKinsey & Company, Quantum Computing: An emerging ecosystem and industry use cases, Dec 2021
https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/quantum%20computing%20use%20cases%20are%20getting%20real%20what%20you%20need%20to%20know/quantum-computing-an-emerging-ecosystem.pdf

Singapore has been contributing actively to the quantum scene

5.   Given the huge potential of quantum computing, investments are significantly increasing in this space. Total private investments in quantum computing have amounted to more than US$3.3 billion from 2001 to 2021[2] and public investments are even higher at nearly US$30 billion to date.

6.   In Singapore, we are deeply invested in understanding and preparing ourselves for the transformative impact of quantum technology.

7.   We started off by developing some of the building blocks more than 15 years ago. A notable commitment was the founding of the Centre for Quantum Technologies in 2007, which is now an internationally-recognised research centre with more than 200 staff and students. As one of the pioneers for quantum research in Singapore and in ASEAN, CQT also plays a role in attracting and training up a strong talent pool, which is going to be key in any, and all of our ambitions.

8.   Over the years, CQT has spun off several budding startups. Those developing quantum software include Entropica Labs and Horizon Quantum Computing. Entropica Labs develops tools, algorithms and software to solve challenging enterprise optimization problems and to advance the performance of quantum computers. Horizon Quantum Computing developed a solution to allow coders to better deploy quantum applications from classical code, supporting better general accessibility to quantum computing. SpeQtral is working toward the launch of a quantum communications satellite in 2024. Atomionics is building sensing systems for navigation and exploration, and S-Fifteen Instruments makes devices for single photon generation and detection.

9.   These Singapore-based startups benefited from the fertile environment here— a talent pool to work with from organisations like CQT, and support through investments by government-backed VCs like SGInnovate. I am proud that Singapore has been a conducive place for these startups' transition from laboratory to market, and we continue to look forward to more ways to strengthen the ecosystem for such startups.

Singapore is playing an active role to connect local and global ecosystem players for more impactful outcomes, and this will bring more opportunities for talent in the quantum sector

10.   Another key effort by the Singapore government has been to develop inclusive platforms for further international collaboration and innovation. We have recently announced three national quantum technology platforms to boost R&D and create new opportunities for those practising quantum technologies.

---

[2] The cumulative value increases to about $4.2 billion when including investments in quantum communication and quantum sensing (ref McKinsey & Company, Quantum Computing: An emerging ecosystem and industry use cases, Dec 2021, page 8).

11.   First, the National Quantum Computing Hub (NQCH) will explore how quantum computers may help us tackle problems in fields from finance to chemistry and to provide access to quantum computers. Second, the National Quantum Fabless Foundry will design, develop and fabricate quantum devices to support quantum technologies R&D across our country's cleanrooms. Third, the National Quantum-Safe Network (NQSN) will trial and deploy quantum-secure technologies, such as quantum key-distribution and post-quantum cryptography. The NQSN has brought together some 15 private and government collaborators [3] including Netlink Trust, ST Engineering and Amazon Web Services. There will be new MOUs signed during this Summit, as a result of all the collaborations and partnerships that have been created here in Singapore.

12.   We hope that all three platforms together will play a role to catalyse multi-stakeholder collaboration, from local to international, and combine the expertise of talent within the academia, government and industry. There is a great amount of work to be done right now to help key sectors like government services, our critical information infrastructure and industrial Internet-of-Things migrate to a Quantum-Safe infrastructure. We want and need to move quickly on this front because delays in transition could expose these services and these platforms today to quantum computer attacks in the future.

Conclusion

13.   The challenges in quantum computing remain very complex. We will continue to invest in the building blocks today, and do our part to catalyse multi-stakeholder collaboration, to put all of us in a better position for future breakthroughs in quantum technology and science. To do so requires the combined efforts of the Government, academia, industry, the talent pool that we have been able to bring together here in Singapore, and that we engage with around the world, and that we have to grow further in the years to come. This talent pool is well-represented by this audience, and I hope it will be well-mentored by those of you who have been working in this field for many years.

14.   I thank you for your contributions and commitment to this effort and to this field. I look forward to not just the insightful discussions at this Summit and collaborations that coming together in person here would bring, but future advances and future breakthroughs in the quantum technology space. This will allow us to develop a more resilient digital world. Thank you very much.

---

[3] Singapore to build National Quantum-Safe Network that provides robust cybersecurity for critical infrastructure, Feb 2022 https://news.nus.edu.sg/national-quantum-safe-network-that-provides-robust-cybersecurity/